

Lesson 6



Cantaloupe growing in compost

The Benefits of Composting

In this final lesson, students examine the role decomposers play in the human practice of composting, which results in two benefits to human communities: maintaining nutrient-rich topsoil and reducing solid waste.

In Lesson 1, students set up a composting demonstration using banana slices and yeast. In this lesson, they revisit their composting samples to note changes in the appearance of the banana slices and in the contents of the two plastic bags. They

apply what they now know about decomposers and the decomposition process to identifying what is happening in each bag. Students reread the *Wonderful Compost* story and discuss how humans depend on decomposers to manage our solid

waste (garbage), reduce our need for more landfill space, and provide nutrient-rich humus to help keep our topsoil healthy. Students conclude the lesson by writing a paragraph about how decomposers are helpful to them and to their community.

Learning Objective

Provide examples of human practices that directly depend on the cycles and processes involving decomposers in terrestrial, freshwater, coastal, and marine ecosystems (e.g., their role in food production and waste management).

Describe the dependence of human practices on the cycles and processes that occur in terrestrial, freshwater, coastal, and marine ecosystems (e.g., the role of decomposers in: food production through soil formation and fertility; waste management through the decay of waste products).



bins are closed containers that act as habitats for decomposers. Typically, people place vegetable and fruit scraps as well as yard and garden trimmings in compost bins; this “waste” serves as a food source for scavengers, such as worms, and for decomposers. Some municipalities, many in California, look to composting as a solution to managing their population’s organic wastes. Several cities, including San Francisco and Oakland, collect organic material from households, businesses, and schools and haul it to large compost facilities, where decomposers turn it into nutrient-rich fertilizer.

As in nature, the rate at which materials decompose in a compost system and the quality of the compost produced depend on several factors, including the addition of air, water, and types of organic materials. Materials high in carbon and nitrogen provide decomposers with the nutrients they need. Equally important, layering materials or physically turning the materials within a compost system helps oxygen easily reach decomposers. Providing adequate moisture also keeps decomposers healthy and thriving. By meeting the needs of decomposers, humans achieve a cost-effective, responsible waste management system that quickly eliminates waste and produces soil-enhancing humus.

Background

Early in world history, humans realized that decomposers could turn waste products such as manure and fallen leaves into a nutrient-rich fertilizer, eliminating the waste altogether. Composting is the human practice of encouraging decomposition within a controlled environment. The positive results of composting are twofold: humans transform organic wastes into humus or, in this scenario, compost, and they elimi-

nate organic materials from their waste stream.

Composting happens on various scales. On a very small scale, humans can compost a banana slice by placing it in a closed container with yeast. The yeast feeds on the banana slice to obtain its energy, and this process results in the eventual breakdown of the banana slice. More often, humans compost by creating compost bins or piles in their backyards or community and school gardens. Compost



Bulldozer in landfill

Key Vocabulary

Compost: A mix of decomposing plant and animal matter that is used to fertilize soil.

Landfill: A place where solid waste, such as garbage and trash, is buried.

Toolbox



Summary of Activities

Students revisit the composting lab, observing what has happened since they placed the materials in the bags. They reread *Wonderful Compost* and discuss how composting can help California communities manage waste and maintain the health of topsoil used to grow food.



Instructional Support

See Extensions & Unit Resources, page 30.

Prerequisite Knowledge



Students should be able to:

- record observations and data.

Advanced Preparation



Gather and prepare Activity Masters:

- Gather students' Activity Masters from previous lessons:
 - *Wonderful Compost* from Lesson 1

Gather and prepare Materials Needed:

- *My Decomposition Book*
- Student composting samples, stored after Lesson 1

Gather and prepare Visual Aids:

- Gather from previous lessons:
 - Photo Cards of *Topsoil* from Lesson 5

Add to Word Wall.



Materials Needed



Class supplies:

- Pencils, scissors, tape

Visual Aids



Photo cards:

- Solid Waste Management, Visual Aid #12

Duration



Preparation Time

15 min.

Instructional Time

50 min.



Safety Notes

Students should not open the sealed plastic bags or remove decomposed banana slices from the classroom.

Activity Masters in the Supporting Materials (SM)

No Activity Masters are required for this lesson.

Procedures

Vocabulary Development

Use the **Unit Dictionary** and the **Vocabulary Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.

Step 1

Organize students into the groups of four from Lesson 1. Distribute students' copies of **My Decomposition Book**. Tell students to discuss with their groups the new Key Vocabulary words on the word wall. Tell students to locate the words on page 1 or 2 of **My Decomposition Book** and write the definitions next to them.

Step 2

When students have finished writing the Key Vocabulary definitions, ask them to turn to pages 3 and 4 in **My Decomposition Book**. Have a few students describe what took place in Lesson 1. (*They put a slice of banana in a bag with yeast [a decomposer] and a slice of banana in a bag by itself; then they predicted what would happen to the bananas in the bags. They drew pictures of what the bags and banana slices looked like. Finally, they stored the bags in a safe place.*)

Tell students that today they are going to re-examine their samples to see what has happened over time. Point out the area where they are to record their observations today.

Stress that students are not to open the bags when they get them back. They should also be careful that the bags do not open accidentally.

Have the student who brought the bags to the storage area in Lesson 1 come to retrieve their group's samples from the storage area and take them back to the group. Have students draw what the bags and samples look like on pages 3 and 4 of **My Decomposition Book**.

Step 3

Ask students if the samples in the bags have changed. (Yes) Ask students what they think has caused the change. (*The bananas have decomposed.*) Ask students if the change is the same in both bags. (*No, the sample with the yeast is different and the bag is full of air [gas].*)

Ask, "What caused the bananas to decompose differently?" (*Yeast, because yeast is a decomposer.*) Tell students that the air (gas) in the bag with the yeast is carbon dioxide, which was released when the yeast broke down the matter of the banana. Students may also see what looks like water in the bag. Water was released during the process.

Note: The bag without yeast will contain bacteria and the non-yeast bag may show some evidence that the banana has decomposed as well. Realizing this, ask students why they think the banana without yeast shows signs of decomposing as well. What could be in the bag (or what might have already been present on the banana) that would have caused the banana to decompose?

Step 4

Distribute the copies of **Wonderful Compost** (Lesson 1 Activity Master) and read the article aloud as a class.

Ask students what would have happened to the food scraps in the article if there were no decomposers in the compost bin. (*The food scraps would not have decomposed and would have piled up.*) Ask students what they think would have happened to the banana slices in their lab if decomposers did not exist. (*They wouldn't have decomposed.*) Have students explain what the decomposers in the narrative and in the banana lab both did for humans. (*They broke down waste left by humans.*) Ask students to cite another way the humans in the **Wonderful Compost** story depended on the work of the decomposers. (*The decomposers created compost for the humans to use in their garden to help grow more food.*)



Step 5

Tape the photo cards of **Topsoil** (Visual Aid #11) in the Central Valley and the photo cards of **Solid Waste Management** (Visual Aid #12) on the board.

Explain that human communities in California produce a lot of solid waste, such as food scraps and yard trimmings, and that some cities dump this waste in landfills while others compost it. Like the people in the article, California cities that compost find that composting can reduce the amount of garbage in the landfill. Composting also produces humus (sometimes called “compost”) that can be used to improve soil for agriculture.

Step 6

Point to the photos taped on the board. Ask students to describe how decomposers are important to the practices in these pictures—agriculture and waste management. Write student responses next to each photo. (*Decomposers make humus that is needed in topsoil to grow crops. Decomposers help compost garbage so that our landfills do not fill up and communities stay clean.*)

Step 7

Have student turn to page 14 in **My Decomposition Book** and answer the questions with the help of their group members. While students are working, collect the plastic bags and composting samples carefully.

When students are done, have them place **Wonderful Compost** inside their copies of **My Decomposition Book** and collect them to use in assessment.

Lesson Assessment

Description

In this lesson, students learn how composting involves decomposers in solid waste management. After recording their observations of the composting samples begun in Lesson 1, students identify composting as one example of a human practice that relies on the process of decomposition; they describe how humans depend on the work of decomposers in agriculture and managing waste by answering the questions on page 14 in *My Decomposition Book*.

Suggested Scoring

Use the Answer Key and Sample Answers on page 99 to assess students' work.

Answer Key and Sample Answers



What Decomposers Do for Me

You have learned many things about decomposers. In the space below, write about how decomposers help you and your community.

Use the following words in your writing:

decomposition	humus	crops
compost	garbage	landfill
nutrients	matter	grow

Decomposers are the organisms that make decomposition happen. They break down matter. The humus they make puts nutrients back into the soil. Humus in the soil helps crops grow; crops produce the foods we eat. Decomposers also can help compost my garbage so that it does not go into the landfill. Then landfills do not get so full, and we do not need so many of them. Humus made in the composting can be used to make the soil better for growing crops.

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Solid Waste Management

Visual Aid — Photo Card



Landfill



Large Compost Facility